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明 細 書

1. 発明の名称

カーエアコン制御装置

2. 特許請求の範囲

通風ダクトを2分割してそれぞれに空気温度調節器を作用的に配置し、一方を上部吹出口、他方を下部吹出口に接続し、さらに前記それぞれの空気温度調節器から前記上部、下部吹出口に至る両空気通路に相互連通部材を配置して両通路を連通、遮断可能にした空調ユニットを有するカーエアコンにおいて、

前記両空気温度調節器と相互連通部材とを制御する制御装置を備え、この制御装置は前記相互連通部材が前記両空気温度調節器を前記上部吹出口のみと接続するときおよび前記下部吹出口のみと接続するとき両空気温度調節器を実質的に同じ調節位置となるように制御し、かつ前記相互連通部材が両空気温度調節器の一方を前記上部吹出口

と接続し他方を前記下部吹出口と接続するのに関連して両空気温度調節器を独立した調節位置となるように制御するように構成されていることを特徴とするカーエアコン制御装置。

3. 発明の詳細な説明

(発明の概要)

本発明は通風ダクトを2分割してそれぞれに空気温度調節器を作用的に配置し、各温度調節器が車室上部と車室下部とに独立して調節空気を供給し得るようにしたカーエアコンにおいて、調節空気の吹出モードの選択と調節空気の温度調節とが適切な関連をもってなされるようにするために、両温度調節器、および両温度調節器の各下流側を上、下部吹出口に接続する通路に配置した相互連通部材を制御装置が関連制御するように構成したことを特徴とする。

(産業上の利用分野)

本発明は調節空気の吹出モードの選択と調節空気の温度調節とを関連して自動制御するようにしたカーエアコン制御装置に関する。

(従来の技術)

このような関連制御を行うカーエアコン制御装置は、特開昭55-51615号公報、同55-68416号公報、あるいは同55-91413号公報により示唆されている。これらの公知のもの、通風ダクトを少なくとも2分割してそれぞれに空気温度調節器を作用的に配置し、一方を上記吹出口、他方を下部吹出口に接続し、さらに前記それぞれの空気温度調節器から前記上部、下部吹出口に至る両空気通路に相互連通部材を配置して両通路を連通、遮断可能にした空調ユニットを有する。

上述の空調ユニットを有する公知技術においては、所定以上の冷房効果あるいは暖房効果を発揮すべき場合に、2つの空気温度調節器の調節位置を一致して制御することも示されている。

出口のみと接続するときに両空気温度調節器を実質的に同じ調節位置となるように制御し、かつ相互連通部材が両空気温度調節器の一方を上部吹出口と接続し他方を下部吹出口と接続するのに関連して両空気温度調節器を独立した調節位置となるように制御するよう構成されていることを特徴とする。

(作用効果)

かかる構成において、制御装置は、この装置を暖房モードで作動させるとき、および冷房モードで作動させるときは、相互連通部材を両空気温度調節器を下部吹出口または上部吹出口の一方のみと接続する位置に制御するとともに、両空気温度調節器を実質的に同じ調節位置となるように制御する。従って、暖房用温風は下部吹出口のみから客室に吹出され、冷房用冷風は上部吹出口のみから客室に吹出される。さらに暖房、冷房のいずれにおいても2つの温度調節器がともに有効に暖房、冷房作用を行うので、十分な暖房効果、冷房効果

(発明が解決しようとする問題点)

一般に自動車の客室の空調を行うにあたり、空調ユニットは客室の空気温度を所定温度に精度よく維持するとともに、調節空気の吹出方向が調節温度との関連において頭寒足熱を基調とした最適方向に制御されるべきである。

本発明は上述した公知技術に示されたような空気温度調節器の分割タイプの空調ユニットを有するカーエアコンにおいて、調節空気の吐出モードの選択を調節空気の温度調節とが適切な関連をもつように自動制御されるカーエアコン制御装置を提供することを目的とする。

(問題点を解決するための手段)

このため本発明は空調温度調節器が通風ダクト内で分割されたタイプの空調ユニットを有するカーエアコン制御装置において、両空気温度調節器と相互連通部材とを制御する制御装置を備え、この制御装置は前記相互連通部材が両空気温度調節器を上部吹出口のみと接続するときおよび下部吹

を發揮する。

さらに、制御装置は、相互連通部材を空気温度調節器の一方を上部吹出口と他方を下部吹出口と接続するバイレベル吹出モードを実現するに際して、空気温度調節器の一方は客室上部への供給空気の温度を、他方は客室下部への供給空気の温度を、それぞれ独立して調節する。

従って、本発明によれば、いかなる吹出モードにおいても頭寒足熱の原則に従って調節空気の温度制御を行うことができ、しかも空気温度調節器の温度調節能力を有効に利用して客室の温度制御を行うことができる。

(実施例)

第1図は本発明の一実施例の構成を示し、空調ユニットAUは通風ダクトPDを有し、数符号で示す次の構成部品により組み立てられ客室32に調節空気を吹出すように構成されている。すなわち、1は内外気導入切替ダンパ、2はブロワモータ、3はブロワモータの回転速度を変える駆動回

路、4はエバポレータ、5はコンプレッサ、6はエバポレータの下流側に近接配置した冷却度検出用の温度センサ、7、8は温度調節用ダンパである。9はヒータコアで、通風ダクトPDにおいて空気通路を上部通路P₁と下部通路P₂とに2分割する仕切板19により2つの部分に分割され、各分割部分に対しダンパ7、8が作用的になるように配置されている。

18は相互連通部材をなす連通ダンパで、上部通路P₁と下部通路P₂のそれぞれのエアミックスチャンバを連通させたり遮断するように構成されている。20、21は連通ダンパ18と連動して動く吹出モード切替ダンパで、連通ダンパ18とともに相互連通部材としても機能する。

13、14はダンパ7、8を作動させる負圧作動器、15、16は負圧作動器をそれぞれ圧力調節する電磁弁、10はヒータコア9への温水流入路を開閉する弁で、17はその電磁作動器、22、23、24、37は各ダンパの負圧作動器、25、26、27、35は各負圧作動器の圧力切替用電

磁弁である。

電気制御装置ECにおいて、11、12はダンパ7、8の位置を検出する位置検出器、28a、28bは客室上部、下部用温度設定器、29は客室上部用空気温度センサ、30は客室下部用空気温度センサ、31は日射センサ、33は外気温センサ、34はヒータコア9へ流入する温水温度を検出するセンサ、38は空調ユニットAUの各種作動モードにおける各作動モードを選択するモードスイッチであり、これら各信号発生手段が生じる信号は制御回路38に入力され、制御回路38は予め設定された制御プログラムに従って入力信号を処理し、処理結果に基づいて空調ユニットAUの前記した機能要素に駆動信号を付与する。

第2図は制御プログラムの流れを示し、制御回路36はステップ100で、通常処理を実行し、空調ユニットAUから客室32へ供給する調節空気の温度を計算する。この計算には、上部下部温度、上部下部設定温度、外気温および日射量が用いられ、計算結果に応じて吹出モード、風量、内

外気切替等の各部の制御が決定される。

次にステップ101で吹出モードの判定を行う。ステップ100で決定したモードがバイレベル(B/L)モードの場合は、ステップ102に進み、その他のベント、ヒート(VENT, HEAT)モードの場合はステップ103に進む。

B/Lモードにおいて、ステップ102で、連通ダンパ18が開となる様に出力される。また、上用室内センサ29の出力により、上部必要吹出温度が計算され、ダンパ7の開度が計算される。また下用室内センサ30の出力により、下部必要吹出温度が計算され、ダンパ8開度が計算される。次にステップ104に進み、両温度調節用ダンパ7、8がそれぞれ102で計算された開度になる様に出力される。なお、このようにダンパ7、8の開度を独立して計算することは公知であり詳細を省く。

これに対し、VENT, HEATモードの場合は、ステップ103で、連通ダンパ18が開じる様に出力され、モード切替ダンパ20、21によ

り上部吹出または下部吹出が選択されダンパ7、8が、ステップ100で計算された開度に一致して調節される様に出力される。

第3図は連通ダンパとモード切替ダンパとを1つのダンパ18Aで実現する例を示す。

4. 図面の簡単な説明

第1図は本発明の一実施例の全体構成図であり、第2図は第1図中制御回路の制御プログラムの流れを示すフローチャート、第3図は本発明の実施例の変形例を示す通風ダクトの部分断面図である。

PD…通風ダクト、AU…空調ユニット、7、8…温度調節用ダンパ、9…ヒータコア、18、18A…相互連通部材をなす連通ダンパ、19…仕切板、20、21…モード切替ダンパ、36…制御回路。

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PAT-NO: JP361202914A
DOCUMENT-IDENTIFIER: JP 61202914 A
TITLE: CONTROL UNIT FOR CAR AIR CONDITIONER
PUBL-DATE: September 8, 1986

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APPL-NO: JP60045092

APPL-DATE: March 6, 1985

INT-CL (IPC): B60H001/00

US-CL-CURRENT: 237/12.3A

ABSTRACT:

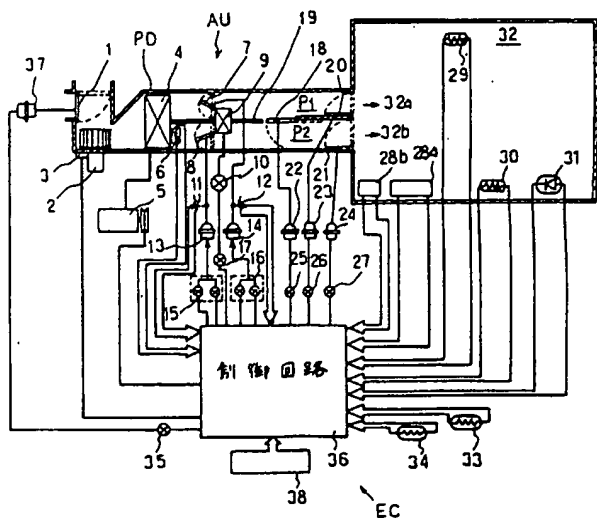
PURPOSE: To obtain a heater which provides a comfortable head-cooling and foot-warming condition by relatingly controlling regulators in accordance with the position of a connecting member which connects divided parts, in an air conditioning unit of a type in which air conditioning temperature regulator is divided in a ventilating duct.

CONSTITUTION: A ventilation duct PD in which an evaporator 4 and a heater

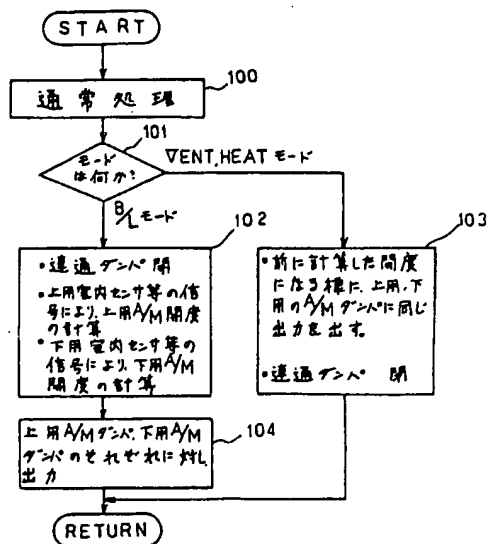
core 9 are provided, is divided into upper and lower passages P<SB>1</SB>, P<SB>2</SB> by means of a partition plate 19 on the lower course side of the evaporator 4, and temperature regulating dampers 7, 8 are provided in each of the passages P<SB>1</SB>, P<SB>2</SB> on the upper course side of the heater core 9. Both of the passages P<SB>1</SB>, P<SB>2</SB> are mutually connected by means of a connecting damper 18. A control unit EC controls the regulating positions of both dampers 7, 8 to be the same when the connecting damper 18 connects the dampers 7, 8 to an upper or a lower blow-out port, and controls the dampers 7, 8 independently when the connecting damper 18 connects one of the dampers 7, 8 to the upper blow-out port while the other to the lower blow-out port.

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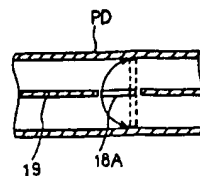
第 1 図



第 2 図



第 3 図



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Japanese Patent

Document No. 61-202914

CAR AIR CONDITIONER CONTROLLER

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UNITED STATES PATENT AND TRADEMARK OFFICE

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Specification

1. Title of the invention

Car Air Conditioner Controller

2. Claim

A car air conditioner controller, characterized by the fact that in a car air conditioner controller in which an air duct is divided into two and air temperature regulators are operatively arranged in each of them, in which one side is connected to an upper air blow-off port and the other side is connected to a lower blow-off port, and in which a mutual connecting member is arranged in both air passages from the above-mentioned each air temperature regulator to the above-mentioned upper and lower blow-off ports so that both passages can be connected and blocked, it is equipped with a controller for controlling the above-mentioned two air temperature regulators and the mutual connecting member; the above-mentioned controller is controlled so that two air temperature regulators may be at the substantially same regulation position when the above-mentioned mutual connecting member connects the above-mentioned two air

¹ Numbers in the margin indicate pagination in the foreign text.

temperature regulators to only the above-mentioned upper blow-off port and when the member connects the regulators to only the above-mentioned lower blow-off port; and the above-mentioned mutual connecting member is controlled so that two air temperature regulators may be at independent regulation positions in relation to the connection of one of two air temperature regulators with the above-mentioned upper blow-off port and the connection of the other with the above-mentioned lower blow-off port.

3. Detailed explanation of the invention

(Outline of the invention)

The present invention is characterized by the fact that in a car air conditioner in which an air duct is divided into two, air temperature regulators are operatively arranged in each of them and each temperature regulator can independently supply a regulating air to the upper part and the lower part of a vehicle cabin, two temperature regulators and a mutual connecting member in which each downstream side of two temperature regulators is disposed in passages being connected to the upper and lower blow-off ports are controlled by a controller so that the selection of a blow-off mode of a regulating air and the

temperature regulation of the regulating air may be carried out with an appropriate relationship.

(Industrial application field)

The present invention pertains to a car air conditioner /2 controller that automatically controls the selection of a blow-off mode of a regulating air and the temperature regulation of the regulating air with a relation.

(Prior art)

The car air conditioner controllers with such a relation control are presented by Japanese Kokai Patent Application Nos. Sho 55[1980]-51615, Sho 55[1980]-68416, or Sho 55[1980]-91413. These well-known car air conditioner controllers have an air conditioning unit in which an air duct is divided into at least two, and air temperature regulators are operatively arranged in each of them, in which one of them is connected to an upper blow-off port and the other is connected to a lower blow-off port, and in which a mutual connecting member is disposed in two air passages from the above-mentioned each air temperature regulator to the above-mentioned upper and lower air-blow ports so that two passages can be connected and blocked.

In the well-known techniques having the above-mentioned air conditioning unit, it is also shown that if a prescribed or higher cooling effect or heating effect is to be exerted, the

regulation positions of two air temperature regulators are matched and controlled.

(Problems to be solved by the invention)

In general, in air-conditioning a guest cabin of an automobile, the air conditioning unit maintains the air temperature of the guest cabin at a prescribed temperature with good precision, and the blow-off direction of a regulating air should be controlled to an optimum direction having a head-cooling and foot-heating conditioning as a basic conditioning.

The purpose of the present invention is to provide a car air conditioner controller in which a car air conditioner having an air conditioning unit of an air temperature regulator-divided type is automatically controlled so that the selection of a blow-off mode of a regulating air and the temperature of the regulating air may have an appropriate relationship.

(Means to solve the problems)

In order to achieve the above purpose, the present invention is characterized by the fact that in a car air conditioner controller having an air conditioning unit in which an air conditioning temperature regulator is divided in an air duct, it is equipped with a controller for controlling the above-mentioned two air temperature regulators and the mutual connecting member; the controller is controlled so that two air

temperature regulators may be at the substantially same regulation position when the above-mentioned mutual connecting member connects two air temperature regulators to only the upper blow-off port and when the member connects the regulators to only the lower blow-off port; and the mutual connecting member is controlled so that two air temperature regulators may be at independent regulation positions in relation to the connection of one of two air temperature regulators with the upper blow-off port and the connection of the other with the lower blow-off port.

(Operation and effects)

In this constitution, when the controller is operated at a heating mode and operated at a cooling mode, the mutual connecting member is controlled at the position where two air temperature regulators are connected to only one of the lower blow-off port and the upper blow-off port, and two air temperature regulators are controlled to the substantially same regulation position. Therefore, a warm air for heating is blown off to the guest cabin from only the upper blow-off port, and a cool air for cooling is blown off to the guest cabin from only the upper blow-off port. Furthermore, since both temperature regulators effectively perform heating and cooling actions for

any of heating and cooling, sufficient heating effect and cooling effect are exerted.

Furthermore, in the controller, in realizing a high-level blow-off mode that connects one of the air temperature regulators to the upper blow-off port and the other to the lower blow-off port by the mutual connecting member, independently, one of the air temperature regulator controls the temperature of the air being supplied to the upper part of the guest cabin, and the other controls the temperature of the air being supplied to the lower part of the guest cabin.

Therefore, according to the present invention, in any blow-off mode, the temperature of the regulating air can be controlled according to the head-cooling and foot-heating principle, and the temperature of the guest cabin can be controlled effectively utilizing the temperature regulation performance of the air temperature regulators.

(Application example)

Figure 1 shows the constitution of an application example of the present invention. An air conditioning unit AU has an air duct PD, is assembled by the following constitutional parts shown by several numerals, and blows off a regulating air to a guest cabin 32. In other words, 1 is an internal and external air intake switching dumper, 2 is a blower motor, 3 is a driving

circuit for changing the rotational velocity of the blower motor. 4 is an evaporator. 5 is a compressor. 6 is a /3 temperature sensor for detecting the degree of cooling adjacently disposed at the downstream of the evaporator. 7 and 8 are dampers for regulating the temperature. 9 is a heater core, is divided into two parts by a partition plate 19 for dividing an air passage into an upper passage P_1 and a lower passage P_2 in an air duct PD, and the damper 7 and 8 are operatively arranged for each divided part.

18 is a connecting damper constituting a mutual connecting member and connects or blocks each air mixing chamber of the upper passage P_1 and the lower passage P_2 . 20 and 21 are blow-off mode switching dampers being operated by interlocking with the connecting damper 18 and function as a mutual connecting member with the connecting damper 18.

13 and 14 are negative pressure operators for generating the dampers 7 and 8. 15 and 16 are electromagnetic valves for respectively adjusting the pressure of the negative pressure operators. 10 is a valve for opening and closing a warm water inflow passage to the heater core 9. 22, 23, 24, and 37 are negative pressure operators of each damper. 25, 26, 27, and 35 are electromagnetic valves for switching the pressure of each negative pressure operator.

In an electric controller EC, 11 and 12 are position detectors for detecting the positions of the dampers 7 and 8. 28a and 28b are temperature setters for the upper part and the lower part of the guest cabin. 29 is an air temperature sensor for the upper part of the guest cabin. 30 is an air temperature sensor for the lower part of the guest cabin. 31 is a sunlight sensor. 33 is an external air temperature sensor. 34 is a sensor for detecting the temperature of a warm water flowing into the heater core 9. 38 is a mode switch for selecting each operation mode in various kinds of operation modes of the air conditioning unit AU, and signals being generated by these each signal generation means are input into a control circuit 38[sic; 36]. The control circuit 36 processes the input signals according to a preset control program and gives a driving signal to the above-mentioned functional elements of the air conditioning unit AU based on the processing results.

Figure 2 shows a flow of the control program. The control circuit 36 implements an ordinary processing at step 100 and calculates the temperature of the regulating air being supplied to the guest cabin 32 from the air conditioning unit AU. In this calculation, the upper and lower temperatures, the upper and lower set temperatures, the external air temperature, and the amount of sunlight are used, and the control of each part

such as blow-off mode, amount of air, and internal and external air switching is determined in accordance with the calculation results.

Next, the blow-off mode is decided at step 101. If the mode determined at step 100 is a high-level (B/L) mode, the flow proceeds to step 102, and if the mode is the other vent and heat mode, the flow proceeds to step 103.

At the B/L mode, the connecting member 18 is opened at step 102. Also, the necessary blow-off temperature of the upper part is calculated by the output of the sensor 29 for the upper part of the guest cabin, and the degree of opening of the damper 7 is calculated. Also, the necessary blow-off temperature of the lower part is calculated by the output of the sensor 30 for the lower part of the guest cabin, and the degree of opening of the damper 8 is calculated. Next, the flow proceeds to step 104, and two dampers 7 and 8 for regulating the temperature are respectively set to the degree of opening calculated at step 102. Also, it is well known to independently calculate the degree of opening of the dampers 7 and 8, and its details are omitted.

On the contrary, at the vent and heat mode, the connecting damper 18 is closed at step 103, and the upper blow-off or lower blow-off is selected by the mode switching dampers 20 and 21.

The dampers 7 and 8 are adjusted to the degree of opening calculated at step 100.

Figure 3 shows an example in which the connecting damper and the mode switching damper are realized by one damper 18A.

4. Brief description of the figures

Figure 1 is an entire constitutional diagram showing an application example of the present invention. Figure 2 is a flow chart showing a control program flow of the control circuit in Figure 1. Figure 3 is a partial cross section showing an air duct showing a modified example of the application example of the present invention.

PD Air duct

AU Air conditioning unit

7, 8 Dampers for regulating the temperature

9 Heater core

18, 18A Connecting members constituting a mutual connecting member

19 Partition plate

~~20, 21 Mode switching dampers~~

36 Control circuit

```

graph TD
    START([START]) --> 100[通常処理]
    100 --> 101{モード  
は何か?}
    101 -- "B/Lモード" --> 102[・通過ゲンプ・開  
・上層室内センサ等の信号により、上層A/M隔度の計算  
・下層室内センサ等の信号により下層A/M隔度の計算]
    101 -- "VENT, HEAT セード" --> 103[・前に計算した隔度  
下層の様に上層、下層のA/Mゲンプに同じ出力を出す  
・通過ゲンプ・開]
    102 --> 104[上層A/Mゲンプ、下層A/Mゲンプのそれぞれに出力]
    103 --> 104
    104 --> RETURN([RETURN])
  
```

The flowchart illustrates the normal processing routine (100). It begins with a START terminal, leading to the main processing block (100). A decision diamond (101) checks the mode. If the mode is B/L mode, the process proceeds to block 102, which calculates the upper and lower A/M clearances based on sensor signals. If the mode is VENT, HEAT SEED, the process proceeds to block 103, which outputs the same A/M clearance values to both the upper and lower dampers and opens the through damper. Both paths lead to block 104, which outputs the calculated clearances to the respective upper and lower A/M dampers, before reaching the RETURN terminal.

36 Control circuit

100 Ordinary processing

102 Opening of the connecting damper

Calculation of the degree of opening of the A/M for the lower part by signals of sensors in the lower cabin

103 The same output is output to the A/M dampers for the upper and lower parts so that a newly calculated degree of opening may be set.

Closing of the connecting damper

104 Output to each of the A/M damper for the upper part and the A/M damper for the lower part

A. Vent and heat mode

B. B/L mode